

UNITED STATES PATENT APPLICATION

of

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for

METHODS AND SYSTEMS FOR
COMPUTER ENHANCED CONFERENCE CALLING

RELATED APPLICATIONS

[001] This application is a continuation-in-part of U.S. Patent Application No. 10/083,793, entitled "METHOD AND APPARATUS FOR CALENDARED COMMUNICATIONS FLOW CONTROL," filed February 27, 2002; U.S. Patent Application No. 10/083,792, entitled "VOICE MAIL INTEGRATION WITH INSTANT MESSENGER," filed February 27, 2002; U.S. Patent Application No. 10/083,884, entitled "DEVICE INDEPENDENT CALLER ID," filed February 27, 2002; and U.S. Patent Application No. 10/083,822, entitled "METHOD AND APPARATUS FOR A UNIFIED COMMUNICATION MANAGEMENT VIA INSTANT MESSAGING," filed February 27, 2002, all of which claim priority to U.S. Provisional Patent Application Nos. 60/272,122, 60/272,167, 60/275,667, 60/275,719, 60/275,020, 60/275,031, and 60/276,505, and all of which are expressly incorporated herein by reference in their entirety.

[002] Applicants also claim the right to priority under 35 U.S.C. § 119(e) based on Provisional Patent Application No. 60/428,704, entitled "DIGITAL COMPANION," filed November 25, 2002; and Provisional Patent Application No. 60/436,018, entitled "DIGITAL COMPANION," filed December 26, 2002, both of which are expressly incorporated herein by reference in their entirety.

[003] The present application also relates to U.S. Patent Application No. 10/084,121, entitled "CALENDAR-BASED CALLING AGENTS," filed February 27, 2002; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR DRAG AND DROP CONFERENCE CALLING," Attorney Docket No. 03-1012;

U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CONFERENCE CALL BUFFERING," Attorney Docket No. 03-1013; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR REMOTE CALL ESTABLISHMENT," Attorney Docket No. 03-1015; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CALL MANAGEMENT WITH USER INTERVENTION," Attorney Docket No. 03-1016; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR DIRECTORY INFORMATION LOOKUP," Attorney Docket No. 03-1017; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR AUTOMATICALLY FORWARDING CALLS TO CELL PHONE," Attorney Docket No. 03-1018; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR ADAPTIVE MESSAGE AND CALL NOTIFICATION," Attorney Docket No. 03-1019; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR A CALL LOG," Attorney Docket No. 03-1020; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR AUTOMATIC FORWARDING OF CALLS TO A PREFERRED DEVICE," Attorney Docket No. 03-1021; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR MULTI-LINE INTEGRATED DEVICE OR LINE MANAGEMENT," Attorney Docket No. 03-1022; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CONTACT MANAGEMENT," Attorney Docket No. 03-1023; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR NOTIFICATION OF CALL TO PHONE DEVICE," Attorney Docket No. 03-1024; U.S. Patent Application No. (_____), entitled

"METHODS AND SYSTEMS FOR SINGLE NUMBER TEXT MESSAGING," Attorney Docket No. 03-1025; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR MULTI-USER SELECTIVE NOTIFICATION," Attorney Docket No. 03-1026; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CPN TRIGGERED COLLABORATION," Attorney Docket No. 03-1027; and U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR PREEMPTIVE REJECTION OF CALLS," Attorney Docket No. 03-1028, all of which are expressly incorporated herein by reference in their entirety.

TECHNICAL FIELD

[004] The present invention relates generally to data processing systems and, more particularly, to a method and system for computer enhanced conference calling.

BACKGROUND

[005] A wide variety of means exist for communication between users. For example, a user may conduct phone calls via a home phone, work phone, and mobile phone. In addition, users may also communicate using devices such as PC's, PDA's, pagers, etc. using manners of communicating such as email and instant messaging.

[006] Unfortunately, managing such a wide variety of communication means can be difficult. In particular, as a user changes location, communication with the user may vary. For example, while on travel, it may only be possible to reach a user by mobile phone. However, the user may best be reached by email while at work. Also, the user may wish to implement various rules for receiving and controlling

communications. For example, to be reached at home, the user may want the home phone to ring three times before forwarding the call to a mobile phone. As another example, the user may wish to be paged each time an email is received from a particular person while away from the office.

[007] A user may also wish to treat a phone call differently dependent on who is calling the user. For example, if a user receives a call from a caller that the user does not want to speak to at the moment, the user may want to send that call directly to voice mail. Also, if a user receives a call from a number that displays no caller ID information or that the user otherwise does not recognize, the user may wish to somehow specially treat the call because the caller is a potential telemarketer.

[008] Further relating to communication between users, a wide variety of means also exist for establishing a conference call between three or more users. For example, one method for establishing a conference call involves having one user call other users (e.g., conference users) and bridging each user onto the conference call. This method requires that the initiating user individually call each conference user.

[009] Another method for establishing a conference call involves using a telephone number that conference users call in order to join the conference call. This method requires that each participant know of the conference call beforehand and requires that a dial-number and access code be assigned to the conference call beforehand.

[010] Yet another method for establishing a conference call involves establishing a predetermined list of conference users and initiating a conference call to

the list of participants at the request of an initiating user. The voice network bridges calls to the conference users to establish the conference call.

[011] Current conference call methods, however, do not enable an initiating user to enhance a conference call by selectively allowing conference users to join a data collaboration in addition to the conference call.

SUMMARY OF THE INVENTION

Methods and systems consistent with the principles of the invention establish a computer-enhanced conference call between a plurality of users. A service center detects a computer-enhanced conference call event that was previously configured by an initiating user. Conference users associated with the computer-enhanced conference call event are thereafter contacted. After at least one response from the conference users is received, a conference call between the initiating user and the conference users is established based on the at least one received response. The service center also establishes a collaboration between the initiating user and conference users that are authorized to participate in the collaboration.

Other methods and systems consistent with the principles of the invention also establish a computer-enhanced conference call between a plurality of users. A service center detects a computer-enhanced conference call event that was previously configured by an initiating user. Conference users associated with the computer-enhanced conference call event are thereafter contacted. After at least one response from the conference users is received, a conference bridge may bridge calls to devices

of the initiating user and the conference users based on the at least one received response, wherein at least one of the calls is forwarded to a preferred device of one of the conference users. The service center also establishes a collaboration between the initiating user and conference users that are authorized to participate in the collaboration.

Other methods and systems consistent with the principles of the invention establish a computer-enhanced conference call. A service center receives information pertaining to a computer-enhanced conference call between a plurality of conference users, including an initiating user, that was setup by the initiating user. The service center also sends a notification of a computer-enhanced conference call request to a device associated with one of the plurality of conference users and receives a response to the notification. Thereafter, a conference call between the initiating user and the conference users and a collaboration between the initiating user and conference users that are authorized to participate in the collaboration are established based on the response.

Other methods and systems consistent with the principles of the invention participate in a computer-enhanced conference call automatically established by at least one or more communication entity. For example, a method consistent with principles of the invention may comprise: scheduling a computer-enhanced conference call at a predetermined time using a calendar application, wherein scheduling includes identifying conference users that are to participate in the computer-enhanced conference call and identifying conference users that are authorized to participate in a

collaboration corresponding to the computer-enhanced conference call; and at the predetermined time: receiving an indication that a computer-enhanced conference call has been configured in accordance with the scheduled computer-enhanced conference call, and receiving an indication that at least one conference user has either joined or declined to join the computer-enhanced conference call.

BRIEF DESCRIPTION OF THE DRAWINGS

[012] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate one embodiment of the invention and, together with the description, serve to explain the principles of the invention.

[013] Fig. 1 is a diagram of an exemplary data processing and telecommunications environment in which features and aspects consistent with the principals of the present invention may be implemented;

[014] Fig. 2 is a diagram of an exemplary user terminal, consistent with the principals of the present invention;

[015] Fig. 3 is a diagram of a voice network, consistent with the principles of the present invention;

[016] Fig. 4 is a block diagram of a service center, consistent with the principles of the present invention;

[017] Fig. 5 illustrates a logical architecture of an exemplary system, consistent with the present invention;

[018] Fig. 6 is a diagram of an exemplary flowchart of a method for initiating an enhanced conference call consistent with the principles of the present invention; and

[019] Fig. 7 is a diagram of an exemplary flowchart of a method for conducting an enhanced conference call consistent with the principles of the present invention.

DETAILED DESCRIPTION

[020] Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts. While the description includes exemplary embodiments, other embodiments are possible, and changes may be made to the embodiments described without departing from the spirit and scope of the invention. The following detailed description does not limit the invention. Instead, the scope of the invention is defined by the appended claims and their equivalents.

Overview

[021] Methods and systems consistent with the present invention establish a computer-enhanced conference call between a plurality of users. A service center detects a computer-enhanced conference call event that was previously configured by an initiating user. Conference users associated with the computer-enhanced conference call event are thereafter contacted at a specific time and/or date specified by the initiating user. After at least one response from the conference users is received, a conference bridge may bridge calls to devices of the initiating user and the

conference users based on the at least one received response, wherein at least one of the calls is forwarded to a preferred device of one of the conference users. The service center also establishes a collaboration between the initiating user and conference users that are authorized to participate in the collaboration. The initiating user may decide which conference users are authorized to participate in the collaboration and make appropriate denotations when setting up the computer-enhanced conference call.

[022] In this manner, users may participate in a computer-enhanced conference call, which is a conference call between multiple users, accompanied by a collaboration between some or all of those users. The collaboration may enable multiple users (e.g., participants) to share data interactively.

Network Environment

[023] Fig. 1 is a block diagram of a data processing and telecommunications environment 100, in which features and aspects consistent with the present invention may be implemented. The number of components in environment 100 is not limited to what is shown and other variations in the number of arrangements of components are possible, consistent with embodiments of the invention. The components of Fig. 1 may be implemented through hardware, software, and/or firmware. Data processing and telecommunications environment 100 may include a data network 102, a voice network 104, and a service center 106. A user 110 may use a user terminal 112 to interface with data network 102 and may use phones 114, 116, and 118 to interface with voice network 104. Other users (not shown) may use user terminals 108 and phones, such

as phones 120, 122, or 124, in a manner similar to the use of user terminal 112 and phones 114, 116, and 118 by user 110.

[024] Data network 102 provides communications between the various entities depicted in environment 100 of Fig. 1, such as user terminal 112 and service center 106. Data network 102 may be a shared, public, or private network and encompass a wide area or local area. Data network 102 may be implemented through any suitable combination of wired and/or wireless communication networks. By way of example, data network 102 may be implemented through a wide area network (WAN), local area network (LAN), an intranet and/or the Internet. Further, service center 106 may be connected to multiple data networks 102, such as, for example, to a wireless carrier network and to the Internet.

[025] Voice network 104 may provide telephony services to users. In one embodiment, voice network 104 may be implemented using a network, such as the Public Switched Telephone Network ("PSTN"). Alternatively, voice network 104 may be implemented on a voice over broadband network, such as a network using voice-over Internet Protocol ("VoIP") technology. Additionally, in other embodiments, the voice network may be a video over broadband network, such as, for example, a network for providing 2-way video communications. In another example, the voice network may be a wireless broadband network, such as, for example, a network using WiFi (i.e., IEEE 802.11(b) and/or (g)). In yet another example, voice network 104 may be a wireless voice network(s), such as, for example, a cellular or third-generation cellular network). In addition, voice network 104 may be implemented using any single or combination of

the above-described technologies consistent with the principles of the present invention. Further, service center 106 may be connected to multiple voice networks 104, such as for example, Verizon's™ Voice Network, voice networks operated by other carriers, and wireless carrier networks.

[026] Service center 106 provides a platform for managing communications over data network 102 and voice network 104. Service center 106 also provides gateway functions, such as code and protocol conversions, to transfer communications between data network 102 and voice network 104. Service center 106 may be implemented using a combination of hardware, software, and/or firmware. For example, service center 106 may be implemented using a plurality of general purpose computers or servers coupled by a network (not shown). Although service center 106 is shown with direct connections to data network 102 and voice network 104, any number and type of network elements may be interposed between service center 106, data network 102, and voice network 104.

[027] User terminal 112 provides user 110 an interface to data network 102. For example, user terminal 112 may be implemented using any device capable of accessing the Internet, such as a general purpose computer or personal computer equipped with a modem. User terminal 112 may also be implemented in other devices, such as the Blackberry™, and Ergo Audrey™. Furthermore, user terminal 112 may be implemented in wireless devices, such as pagers, mobile phones (with data access functions), and Personal Digital Assistants ("PDA") with network connections.

[028] User terminal 112 also allows user 110 to communicate with service center 106. For example, user 110 may use instant messaging ("IM") to communicate with service center 106. In addition, user terminal 112 may use other aspects of TCP/IP including the hypertext transfer protocol ("HTTP"); the user datagram protocol ("UDP"); the file transfer protocol ("FTP"); the hypertext markup language ("HTML"); and the extensible markup language ("XML").

[029] Furthermore, user terminal 112 may communicate directly with service center 106. For example, a client application may be installed on user terminal 112, which directly communicates with service center 106. Also, user terminal 112 may communicate with service center 106 via a proxy.

[030] User terminals 108a-108n may provide functions to other users similar to those provided by user terminal 112 to user 110. One of ordinary skill in the art will appreciate that user terminals 108a-108n may be implemented using devices similar to those used to implement user terminal 112.

[031] Phones 114, 116, 118, 120, 122, and 124 interface with voice network 104. Phones 114, 116, 118, 120, 122, and 124 may be implemented using known devices, including wireline phones and mobile phones. Although phones 114, 116, 118, 120, 122, and 124 are shown directly connected to voice network 104, any number of intervening elements, such as a private branch exchange ("PBX"), may be interposed between phones 114, 116, 118, 120, 122, and 124, and voice network 104.

[032] Fig. 2 is a block diagram of a user terminal consistent with the present invention. User terminal 112 may include a central processing unit (CPU) 200, a

memory 202, a storage module 204, a network interface 206, an input interface 208, an output interface 210, an input device 216, and an output device 218. One of ordinary skill in the art will appreciate that user terminals 108a-108n may include components similar to those shown for user terminal 112.

[033] CPU 200 provides control and processing functions for user terminal 112. Although Fig. 2 illustrates a single CPU, user terminal 112 may include multiple CPUs. CPU 200 may also include, for example, one or more of the following: a co-processor, memory, registers, and other processing devices and systems as appropriate. CPU 200 may be implemented, for example, using a Pentium™ processor provided from Intel Corporation.

[034] Memory 202 provides a primary memory for CPU 200, such as for program code. Memory 202 may be embodied with a variety of components of subsystems, including a random access memory ("RAM") and a read-only memory ("ROM"). When user terminal 112 executes an application installed in storage module 204, CPU 200 may download at least a portion of the program code from storage module 204 into memory 202. As CPU 200 executes the program code, CPU 200 may also retrieve additional portions of program code from storage module 204.

[035] Storage module 204 may provide mass storage for user terminal 112. Storage module 204 may be implemented with a variety of components or subsystems including, for example, a hard drive, an optical drive, CD ROM drive, DVD drive, a general-purpose storage device, a removable storage device, and/or other devices capable of storing information. Further, although storage module 204 is shown within

user terminal 112, storage module 204 may be implemented external to user terminal 112.

[036] Storage module 204 includes program code and information for user terminal 112 to communicate with service center 106. Storage module 204 may include, for example, program code for a calendar application, such as GroupWise provided by Novell Corporation or Outlook provided by Microsoft Corporation; a client application, such as a Microsoft Network Messenger Service (MSNMS) client or America Online Instant Messenger (AIM) client; and an Operating System (OS), such as the Windows Operation System provided by Microsoft Corporation. In addition, storage module 204 may include other program code and information, such as program code for TCP/IP communications; kernel and device drivers; configuration information, such as a Dynamic Host Configuration Protocol (DHCP) configuration; a web browser, such as Internet Explorer provided by Microsoft Corporation, or Netscape Communicator provided by Netscape Corporation; and any other software that may be installed on user terminal 112.

[037] Network interface 206 provides a communications interface between user terminal 112 and data network 102. Network interface 206 may receive and transmit communications for user terminal 112. For example, network interface 206 may be a modem, or a local area network ("LAN") port.

[038] Input interface 208 receives input from user 110 via input device 212 and provides the input to CPU 200. Input device 212 may include, for example, a keyboard,

a microphone, and a mouse. Other types of input devices may also be implemented consistent with the principles of the present invention.

[039] Output interface 210 provides information to user 110 via output device 214. Output device 214 may include, for example, a display, a printer, and a speaker. Other types of output devices may also be implemented consistent with the principles of the present invention.

[040] Fig. 3 is a diagram of a voice network, consistent with the principles of the present invention. As shown, voice network 104 includes an intelligent service control point (ISCP) 302, service transfer points (STP) 304 and 306, service switching points (SSP) 308 and 310, a line information database (LIDB) 312, an ISCP Service Provisioning And Creation Environment (SPACE) 314, a Recent Change Environment 316, an Intelligent Peripheral (IP) 320, a switch access 322, and a conference bridge 324. Although this embodiment voice network 104 is described as a PSTN, as discussed above in other embodiments, the voice network 104 may be, for example, a voice or video over broadband network a wireless broadband, a wireless voice network, etc.

[041] Voice network 104 may be implemented using the PSTN and SS7 as a signaling protocol. The SS7 protocol allows voice network 104 to provide features, such as call forwarding, caller-ID, three-way calling, wireless services such as roaming and mobile subscriber authentication, local number portability, and toll-free/toll services. The SS7 protocol provides various types of messages to support the features of voice network 104. For example, these SS7 messages may include Transaction Capabilities

Applications Part ("TCAP") messages to support event "triggers," and queries and responses between ISCP 302 and SSPs 308 and 310.

[042] ISCP 302 may also be, for example, a standard service control point (SCP) or an Advanced Intelligent Network (AIN) SCP. ISCP 302 provides translation and routing services of SS7 messages to support the features of voice network 104, such as call forwarding. In addition, ISCP 302 may exchange information with the service center 106 using TCP/IP or SS7. ISCP 302 may include service logic used to provide a switch, such as SSP 308 or 310, with specific call processing instructions. ISCP 302 may also store data related to various features that a user may activate. Such features may include, for example, call intercept and voice mail. ISCP 302 may be implemented using a combination of known hardware and software. ISCP 302 is shown with a direct connection to service center 106 and a connection to ISCP SPACE 314, however, any number of network elements including routers, switches, hubs, etc., may be used to connect ISCP 302, ISCP SPACE 314, and service center 106. Further, information exchanged between the ISCP 302 and service center 106 may use, for example, the SR-3389 General Data Interface (GDI) for TCP/IP.

[043] STPs 304 and 306 relay SS7 messages within voice network 104. For example, STP 304 may route SS7 messages between SSPs 308 and 310. STP 304 or 306 may be implemented using known hardware and software from manufacturers such as NORTEL™ and LUCENT Technologies™.

[044] SSPs 308 and 310 provide an interface between voice network 104 and phones 120 and 118, respectively, to setup, manage, and release telephone calls within

voice network 104. SSPs 308 and 310 may be implemented as a voice switch, an SS7 switch, or a computer connected to a switch. SSPs 308 and 310 exchange SS7 signal units to support a telephone call between a calling party and user 110. For example, SSPs 308 and 310 may exchange SS7 messages, such as TCAP messages, within message signal units ("MSU") to control calls, perform database queries to configuration database 312, and provide maintenance information.

[045] Line Information Database (LIDB) 312 comprises one or more known databases to support the features of voice network 104. For example, LIDB 312 may include subscriber information, such as a service profile, name and address, and credit card validation information. Although, in this figure, LIDB 312 is illustrated as directly connected to ISCP 302, LIDB 312 may be connected to ISCP 302 through an STP (e.g., 304 and 306). Additionally, this communication link may use, for example, the GR-2838 General Dynamic Interface (GDI) for SS7.

[046] ISCP Service Provisioning and Creation Environment (SPACE) 314 may be included as part of ISCP 302 or be separate from ISCP 302. For example, the Telcordia™ ISCP may include an environment similar to SPACE 314 as part of the product. Further, ISCP SPACE 314 may include one or more servers. ISCP SPACE 314 is the point in the ISCP platform where customer record updates may be made.

[047] In one embodiment, customer records may be stored in ISCP SPACE 314 such that the records may be updated and sent to the ISCP 302. These records may include information regarding how to handle calls directed to the customer. For example, these customer records may include information regarding whether or not

calls for the customer are to be forwarded to a different number, and/or whether or not the call should be directed to an IP, such as a voice mail system, after a certain number of rings. Additionally, one ISCP SPACE 314 may provide updates to one or more ISCPs 302 via an ISCP network (not shown).

[048] Additionally, voice network 104 may include one or more recent change engines 316 such as, for example, an Enterprise Recent Change engine (eRC); an Assignment, Activation, and Inventory System (AAIS); or a multi-services platform (MSP). As an example, the eRC and AAIS may be used in voice networks 104 located in the western part of the United States, while an MSP may be used in networks in the eastern part. The recent change engines may be used to update switch and ISCP databases. For example, a recent change engine may deliver database updates to SSPs and to ISCPs, such that when updating databases, these recent change engines emulate human operators. Additionally, if the instructions are to be sent to an ISCP 302, the recent change engine may first send the instructions to ISCP SPACE 314, which then propagates the instructions to ISCP 302 as discussed above. Further, an MSP may be used, for example, for providing updates to both SSPs 308 or 310 and ISCPs 302. Or, for example, an eRC may be used for providing updates to SSPs 308 or 310, while an AAIS is used for providing updates to the ISCPs 302.

[049] Updates sent to SSPs 308 or 310 may be sent from recent change engine 316 via a switch access 322 that may, for example, convert the updates into the appropriate protocol for SSP 308 or 310. For example, recent change engine 316 may send updates to SSPs 308 or 310 via TCP/IP. Switch access 322 may then convert the

updates from TCP/IP to X.25. Switch access 322 may be implemented using hardware and/or software. These connections may include any number of elements, such as, for example, switches, routers, hubs, etc. and may be, for example, an internal data network for voice network 104.

[050] Voice network 104 may also include one or more intelligent peripherals (IP). For example, in Fig. 3, an IP 320 is illustrated as being connected to SSP 308. These IPs may be used for providing functions for interaction between users and the voice network, such as voice mail services, digit collection, customized announcements, voice recognition, etc. Moreover, the communications between the SSP 308 and IP 320 may use the Primary Rate interface (PRI) (e.g., the 1129 protocol) protocol. Additionally, IP 320 may be capable of sending and receiving information to/from the Service Center 106. These communications may use, for example, the SR-3511 protocol. Further, although Fig. 3 illustrates this connection as a direct connection, this connection may include any number of elements including routers, switches, hubs, etc., and may be via, for example, an internal data network for the voice network 104.

[051] Additionally, voice network 104 may include one or more conference bridges 324. Conference bridge 324 may be operable to host a conference call between users, or host multiple simultaneous conference calls between users. For example, conference bridge 324 may receive commands to call various users (e.g., conference users) at specific phones (e.g., telephones 118 or 120, or any other phone connected to voice network 104. The calls to users may be made at a predetermined time. Upon establishing contact with a user, conference bridge 324 enables that user

to participate in a conference call with other users. In one embodiment, conference bridge 324 may be implemented using a commercially available conference bridge such as those manufactured by Voyant Technologies, Cisco, Nortel Networks, etc. Further, although Fig. 3 illustrates conference bridge 324 as being directly connected to service center 106 and SSP 310, these connections may include any number of elements including routers, switches, hubs, etc., and may be via, for example, an internal data network for the voice network 104.

[052] Fig. 4 is a block diagram of a service center, consistent with the principles of the present invention. As shown, service center 106 may include firewalls 402 and 404, one or more digital companion servers 406, one or more communication portal servers 408, one or more network access servers 410, and a voice portal 412. Voice portal 412 may include a voice portal application server 414 and a voice recognition server 416. A network 418 may be used to interconnect the firewalls and servers. Additionally, conference server 420 may be provided between the service center 106 and the voice network 104.

[053] Firewalls 402 and 404 provide security services for communications between service center 106, data network 102, and voice network 104, respectively. For example, firewalls 402 and 404 may restrict communications between user terminal 112 and one or more servers within service center 106. Any appropriate security policy may be implemented in firewalls 402 and 404 consistent with the principles of the present invention. Firewalls 402 and 404 may be implemented using a combination of known hardware and software, such as the Raptor Firewall provided by the Axent

Corporation. Further, firewalls 402 and 404 may be implemented as separate machines within service center 106, or implemented on one or more machines external to service center 106.

[054] Network 418 may be any type of network, such as an Ethernet or FDDI network. Additionally, network 418 may also include switches and routers as appropriate without departing from the scope of the invention. Further, additional firewalls may be present in the network 418, for example, to place one or more of servers 406, 408, 410, or voice portal 412 behind additional firewalls.

[055] Each server (406, 408, 410, 414, 416, 420) may be any appropriate type of server or computer, such as a Unix or DOS-based server or computer. The servers may implement various logical functions, such as those described below. In Fig. 4, a different server is illustrated as being used for each logical function. In other embodiments, the logical functions may be split across multiple servers, multiple servers may be used to implement a single function, all functions may be performed by a single server, etc.

[056] In general, digital companion server 406 may provide the software and hardware for providing specific services of the service center to a customer, that is, a user that subscribes to various services of service center 106. Exemplary services include, for example, permitting a customer to add contacts to their address book from a history of calls made or received by the customer, permitting a customer to make calls directly from their address book, scheduling a call to be placed at a specific time, or permitting the customer to look at the name and/or address associated with a phone

number. Additionally, these services may include permitting the customer to listen to their voice mail on-line, forwarding their calls based on a scheduler and/or the calling parties number, setting up conference calls on-line, real-time call management, setting up computer-enhanced conference calls, etc.

[057] Communication portal server 408 may provide the hardware and software for managing a customer's account and interfacing with customer account information stored by the provider of customer's voice network 104. Network access servers 410 may provide the hardware and software for sending and receiving information to voice network 104 in processing the applications provided by the service center. For example, network access servers 410 may be used for transmitting and/or receiving information from/to an ISCP 302 or an SSP 308 or 310 of voice network 104.

[058] Voice portal 412 includes software and hardware for receiving and processing instructions from a customer via voice. For example, a customer may dial a specific number for voice portal 412. Then the customer using speech may instruct service center 106 to modify the services to which the customer subscribes. Voice portal 412 may include, for example, a voice recognition function 416 and an application function 414. Voice recognition function 416 may receive and interpret dictation, or recognize spoken commands. Application function 414 may take, for example, the output from voice recognition function 416, convert it to a format suitable for service center 106 and forward the information to one or more servers (406, 408, 410) in service center 106.

[059] Fig. 5 illustrates a logical architecture of an exemplary system, consistent with the present invention. As illustrated, the logical architecture may be split into four planes: client side 502, application service 504, network access 506, and the voice network 508.

[060] Client side 502 includes user terminals 112_A and 112_B that a user may use to send and/or receive information to/from the service center 106. Additionally, client side 502 includes the user's phone(s) 114. As discussed above, user terminals 112 may be any type of device a user may use for communicating with service center 106. For example, user terminal 112_A may be a PDA running a program for communicating with service center 106, while user terminal 112_B may be a desktop type computer running a web browser for communicating with the service center 106 via the Internet. Additionally, the user may have one or more phones 114, such as, for example, one or more standard landline telephones and/or wireless phones.

[061] Application service plane 504 includes digital companion server(s) 406, communication portal server(s) 408, and voice portal 412. These entities may communicate between one another using, for example, web services or any other suitable protocols. Web services are a standardized way of integrating Web-based applications using the Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description, Discovery and Integration (UDDI) open standards over an Internet protocol (IP) backbone.

[062] As illustrated, a digital companion server 406 may provide the following functions: a client proxy 512, a web server 514, an application server function 516, a calendar server function 518, a notification server function 520, and a database function 522. Each of these functions may be performed in hardware, software, and/or firmware. Further, these functions may each be executed by a separate server, split across multiple servers, included on the same server functions, or any other manner.

[063] Client proxy function 512 provides a proxy function for the digital companion that may be used for security purposes. This client proxy function 512 may be included in a separate server such that all communications sent from the other digital companion functions/servers to a user terminal 112 via data network 102 go through client proxy 512. Also, if client proxy 512 is included on a separate server, for example, an additional firewall may be provided between client proxy 512 and the other digital companion servers to provide additional security.

[064] Web server 514 provides functionality for receiving traffic over data network 102 from a customer. For example, web server 514 may be a standard web server that a customer may access using a web browser program, such as Internet Explorer or Netscape Communicator.

[065] Application server function 516 encompasses the general functions performed by digital companion server(s) 406. For example, these functions may include interfacing with the various other digital companion functions to perform specific services provided by the service center. These services may include, for example, interfacing with other function(s), software, and/or hardware to provide a customer with

the capability of managing their calls online. For example, permitting a customer to add contacts to their address book from a history of calls made or received by the customer, permitting a customer to make calls directly from their address book, scheduling a call to be placed at a specific time, or permitting the customer to look at the name and/or address associated with a phone number. Additionally, these services may include permitting the customer to listen to their voice mail on-line, forwarding their calls based on a scheduler and/or the calling parties number, setting up conference calls on-line, enabling call management with user intervention in real-time, setting up computer-enhanced conference calls, etc.

[066] Additionally, application server function 516 may interface with one or more external devices, such as an external web server, for retrieving or sending information. For example, application server function 516 may interface with a voice network's data center 556 (e.g., verizon.com) to determine the services to which the customer subscribes (e.g., call waiting, call forwarding, voice mail, etc.).

[067] Calendar server function 518 may provide the capability of scheduling events, logging when certain events occurred, triggering the application-functions to perform a function at a particular time, etc. In one aspect of the invention, calendar server function 518 generates and maintains a scheduling data structure, such as a user calendar that includes scheduling events (e.g., meetings, tasks, etc.), that are created by the user through user terminal 112_A. For example, a user may schedule a conference call event in a calendar application reflecting a time and date when the user is to participate in a conference call that is be established in accordance with certain

aspects related to the present invention. Calendar server function 518 may operate with, or leverage, application server function 516 to initiate conference call configuration processes consistent with aspects of the invention.

[068] Notification server function 520 provides the capability to send information from the service center 106 to a user terminal 112. For example, notification server function 520 at the direction of application server function 516 may send a notification to user terminal 112 that the user is presently receiving a phone call at the user's phone 114. This notification may be, for example, an instant message pop-up window that provides an identification of the caller as well as the number being called. The notification may also have a number of user-selectable buttons or items associated with it that enable the user to manage a call in real-time.

[069] Database function 522 provides the storage of information useable by the various applications executed by the digital companion servers. These databases may be included in, for example, one or more external storage devices connected to the digital companion servers. Alternatively, the databases may be included in storage devices within the digital companion servers themselves. The storage devices providing database function 522 may be any type of storage device, such as for example, CD-ROMs, DVD's, disk drives, magnetic tape, etc.

[070] As discussed above, communication portal server(s) 408 provide the hardware and software for managing a customer's account and interfacing with customer account information stored by the provider of customer's voice network 104. As illustrated in Fig. 5, a communication portal server 408 may provide the following

functions: a web server function 526, an application server function 528, a contacts database function 530, and/or a customer profile function 532. Each of these functions may be performed by a separate server, split across multiple servers, included on the same server functions, or any other manner.

[071] Web server function 526, as with web server function 514 of the digital companion servers, provides functionality for receiving traffic over data network 102 from a customer. For example, the web server may be a standard web server that a customer may access using a web browser, such as Internet Explorer or Netscape Communicator.

[072] Application server function 528 encompasses the general functions performed by communication portal servers 408. For example, these functions may include interfacing with the voice network to retrieve and/or modify customer profile information, and creating and editing an address book for the user. Additionally, application server function 528 may include the functionality of sending and/or receiving information to/from external servers and/or devices. For example, communication portal servers 408 may be connected to a network, such as, the Internet. Application server function 528 may then provide connectivity over the Internet to external servers 552 that provide web services, such as the Superpages web page. Application server function 528 could then contact these external services 552 to retrieve information, such as an address for a person in the user's address book.

[073] In another example, application server function 528 of communication portal 408 may interface a single sign on (SSO) server 554. SSO 554 may be used to

allow users to access all services to which the user subscribes, on the basis of a single authentication that is performed when they initially access the network.

[074] Moreover, application server function 528, similar to application server 516, may provide functionality to facilitate services performed by the service center. These services may include, for example, interfacing with other function(s), software, and/or hardware to provide a customer with the capability of managing their calls online. For example, permitting a customer to add contacts to their address book from a history of calls made or received by the customer, permitting a customer to make calls directly from their address book, scheduling a call to be placed at a specific time, or permitting the customer to look at the name and/or address associated with a phone number. Additionally, these services may include permitting the customer to listen to their voice mail on-line, forwarding their calls based on a scheduler and/or the calling parties number, setting up conference calls on-line, enabling call management with user intervention in real-time, setting up computer-enhanced conference calls, etc.

[075] Contacts database 530 includes storage devices for storing an address book for the user. This address book may be any appropriate type of address book. For example, the user's address book may include the names, phone numbers, and addresses of people and/or organizations. These storage devices may be internal or external to communication portal servers 406 or some combination in between. In addition, these storage devices may be any type of storage device, such as magnetic storage, memory storage, etc.

[076] Customer profile database 532 includes storage devices for storing customer profile information for the user. These storage devices may be the same or separate storage devices used for the contacts database. The customer profile may include information regarding the user's account for their voice network. For example, this information may include the user's name, billing address, and other account information. Additionally, the customer profile may include information regarding voice services to which the user subscribes, such as, for example, call waiting, voice mail, etc.

[077] Application services plane 504 may also include a voice portal 412. As discussed above, voice portal 412 may include, for example, a voice recognition function 416 and an application server function 414, and be used for receiving and processing instructions from a customer via voice. Voice recognition function 416 may be implemented using hardware and/or software capable of providing voice recognition capabilities. This hardware and/or software may be a commercially available product, such as the Voice Application platform available from Tellme Networks, Incorporated. Application server function 414 may include hardware and/or software for exchanging information between digital companion servers 406 and voice recognition function 416. Additionally, application server function 414 may be included on a separate server, included in the hardware and software providing voice recognition function 416, included in digital companion servers 406, etc.

[078] Network access plane 506 includes the functions for providing connectivity between application service plane 502 and voice network 104. For example, this plane

may include recent change engines 316, network access servers 410, and/or back end servers 420.

[079] As discussed above, recent change engines 316 may be used to update switches and ISCP databases included in voice network 104. In one embodiment, recent change engines 316 may include an AAIS 544, an eRC 546, and/or an MSP 548. Additionally, a proxy 542 may be used between digital companion servers 406 and recent change engines 316 for security purposes.

[080] Network access servers 410 may be included in service center 106 and may provide the hardware and software for sending and receiving information to voice network 104 in processing the applications provided by the service center. For example, network access servers 410 may include a Caller ID (CID) functionality for retrieving caller ID information from voice network 104, a click to dial (CTD) functionality for instructing an intelligent peripheral (IP) in the voice network to place a call via an SSP, and/or a real time call management (RTCM) functionality for interfacing with an ISCP of the voice network.

[081] Network access plane 506 may also include one or more back end server(s) (not shown). These back end server(s) may include hardware and/or software for interfacing service center 106 and voice network 104. The back end server(s) may be connected to service center 106 by a network, by a direct connection, or in any other suitable manner. Further, the back end server(s) may connect to one or more devices in voice network 104 by a network, a direct connection, or in any other suitable manner.

[082] The back end server(s) may include, for example, a server providing a voice mail retrieval and notification function. This voice mail retrieval and notification function may include the capability to receive notifications when a user receives a voice mail, physically call a user's voice mail system, enter the appropriate codes to retrieve the voice mail, retrieve the voice mail, convert the voice mail to a digital file, and send it to digital companion servers 406.

[083] Additionally, these back end server(s) may also include, for example, a directory assistance server. This directory assistance server may interface the service center 106 with a Reverse Directory Assistance Gateway (RDA Gateway) of voice network 104. An RDA Gateway is a device for issuing requests to a Data Operations Center (DOC) of voice network 104 for name and/or address information associated with a phone number and receiving the name and/or phone number in response to this request.

[084] In another example, the back end server(s) may include a wireless internet gateway that is used for interfacing with a mobile switching center (MSC) of a wireless voice network. As with the above-described back end server(s), this wireless internet gateway may be used for converting requests and information between the formats used by service center 106 and those used by the wireless voice network.

[085] In yet another example, the back end server(s) may include a Single Number Short Message Service (SN SMS) server for interfacing service center 106 with a Short Message Service (SMS) gateway in voice network 104. This may be used to

permit the customer to have SMS messages addressed to their home phone number directed to an SMS capable device of the users choosing.

[086] Moreover, network access plane 506 may also include a conference server 420 for instructing a conference bridge 324 in voice network 104 to dial out via an SSP to the participants of a voice conference. Alternatively, for example, conference server 420 may instruct an IP 320 of the voice network to place a call between multiple parties by dialing out to each of the parties. Conference server 420 may also include the capability to instruct conference bridge 324 or IP 320 to call an audio digitizing device that can listen to the conference, convert the audio signals to digital format, and forward the digitized signals to a user device via, for example, an audio streaming server. The audio streaming server may, for example, allow a user to connect to it via, for example, the Internet. Additionally, the audio streaming device may buffer or record the signals to permit the user to pause, rewind, and/or fast-forward thru the conference.

[087] Voice network plane 508 includes the hardware and software included in voice network 104, as discussed above with reference to Fig. 3. For example, voice network plane 508 may include ISCP SPACE 314, ISCP 302, intelligent peripherals 320 (not shown), conference bridge 324, and SSP 308. Additionally, voice network plane 508 may also include the hardware and software included in a wireless carrier's network, such as, for example, the mobile switching center, etc.

System Operation

[088] Fig. 6 is a diagram of an exemplary flowchart of a method for initiating an enhanced conference call consistent with the principles of the present invention. Although the steps of the flowchart are described in a particular order, one skilled in the art will appreciate that these steps may be performed in a modified or different order. Further, one or more of the steps in Fig. 6 may be performed concurrently or in parallel.

[089] Consistent with the present invention, a computer-enhanced conference call is a conference call between multiple users, accompanied by a collaboration between some or all of those users. Generally, collaboration may comprise multiple users (e.g., participants) sharing data interactively. For example, users participating in a collaborative session may share data in various ways, such as whiteboards, document sharing, and/or application sharing. A whiteboard is essentially an electronic chalkboard that allows users at various sites to simultaneously write and draw on an on-screen notepad viewed by multiple users (e.g., collaborate in real-time with others using graphic information). With a whiteboard, a user may review, create, and update graphic information; manipulate contents by clicking, dragging, and dropping information on the whiteboard; cut, copy, and paste information from other applications onto the whiteboard; save whiteboard contents for future reference; and otherwise edit or modify information on the whiteboard so that other users can view the changes. Document sharing may refer, for example, to the ability to allow one or more documents to be viewed, edited, saved, or replaced by multiple users participating in a collaborative session. Application sharing may refer, for example, to the ability to allow one or more

applications to be viewed or otherwise controlled by multiple users participating in a collaborative session.

[090] As illustrated in Fig. 6, a user acting as an initiating user may set up one or more computer-enhanced conference call events through a device, such as user terminal 112, and service center 106 (step 602). For example, the initiating user may access a calendar application and an address book provided by service center 106 to add conference users to a proposed conference call meeting. To do so, in one example, the initiating user may access conference user information displayed in a graphical representation of an address book corresponding to the initiating user. Using an input device (e.g., a mouse, stylus, etc.), the initiating user may select profile information for a conference user from the address book display and drop it in a conference call icon, also displayed, which is included in the calendar application for a proposed time and date (e.g., Monday, December 7, 2003, 9:00 AM EST). Alternatively, the initiating user may select a date and time for a proposed computer-enhanced conference call and add conference users to a participant list provided in graphical form on the display device in user terminal 112.

[091] Additionally, the initiating user may provide, for each conference user added to the proposed conference call, an indication as to whether or not that user should be allowed to collaborate with other users. For example, the initiating user may not wish to enable every participant to be able to share data with other participants. In such a case, the initiating user may use an input device to designate that a particular participant should not be part of any collaboration between participants. Alternatively,

the default may be that a participant does not participate in a collaboration unless the initiating user designates that a particular participant should be part of any collaboration between participants.

[092] In one aspect of the invention, service center 106 employs application server 516 to allow the initiating user to schedule a conference call to take place at a specific time and date. One skilled in the art will appreciate, however, that different mechanisms and methods may be employed to enable the initiating user to schedule a computer-enhanced conference call with one or more conference users without departing from the scope of the invention. For example, instead of scheduling a computer-enhanced conference call for a future date and time, an initiating user may indicate that the computer-enhanced conference call should occur immediately.

[093] Periodically, application server 516 and/or calendar server 518 may scan the calendar application associated with the initiating user to determine whether a computer-enhanced conference call event is detected (step 604). The conference call event may act as a trigger that directs application server 516 to automatically set up a computer-enhanced conference call for the initiating user. For example, calendar server 518 may determine whether a current date and time matches, or is within some predetermined range of, a scheduled conference call for the initiating user. For instance, suppose an initiating user, such as user 110, previously scheduled a computer-enhanced conference call with three other users listed in user 110's address book for a particular date (e.g., Monday, November 17, 2003, at 10:00 AM EST). On that date and/or time (i.e., November 17, 2003), or sometime earlier, calendar server

518 may trigger a computer-enhanced conference call event that instructs application server 516 to begin configuring a computer-enhanced conference call in accordance with the particulars set up by user 110 and represented in the user's calendar.

Alternatively, in the case of an immediate computer-enhanced conference call, application server 516 may detect a computer-enhanced conference call event as soon as the initiating user has submitted the required information. Such information may include, for example, identification of at least one conference user and an indication of whether the at least one conference user may participate in a collaboration.

[094] Once a computer-enhanced conference call event is detected, application server 516 generates a computer-enhanced conference call message. The message includes profile information for each conference user included in a participant list associated with the detected scheduled computer-enhanced conference call. For example, application server 516 may collect the telephone numbers and identifiers for each conference user and add them to the message. In addition, application server 516 may also include information in the message reflective of whether different conference users should be allowed to participate in a collaboration between conference users. Once the computer-enhanced conference call message is generated, application server 516 formats the message for an appropriate transmission protocol and sends the message to conference server 420 (step 606). In one aspect of the invention, application server 516 may format the message into an XML message and transmit the message to conference server 420 using TCP/IP protocol. Other types of transmission protocols and information formats, however, may be implemented

to transport the computer-enhanced conference call message to conference server 420.

[095] Conference server 420 may extract information included in the computer-enhanced conference call message to generate a conference bridge message. A conference bridge message may be a set of commands that are directed to a specific bridge (e.g., conference bridge 324) that instructs the bridge to set up a conference call by dialing out to the users identified in the computer-enhanced conference call message. In one aspect of the invention, conference server 420 may determine which one of a plurality of bridges (not shown) is configured to handle conference call communications with any of the conference users. Conference server 420 may identify conference bridge 324 as being dedicated to handle conference call operations and thus generate a conference bridge message based on the identification of conference bridge 324. That is, conference server 420 may format a message that includes one or more commands directed to conference bridge 324. The conference bridge message may also include information reflective of whether different conference users have authorization to participate in a collaboration between conference users.

[096] Conference bridge 324 may receive the conference bridge message and, based on the commands included in the message, may set up a conference call that includes the initiating user and any other conference users identified in the conference bridge message (step 608). In one aspect of the invention, conference bridge 324 may collect the telephone number for each conference user (including the initiating user) from the conference bridge message. Once the conference call is configured,

conference bridge 324 may use the collected telephone numbers to call conference users (step 610). For example, conference bridge 324 may attempt dial out to each device (e.g., user terminals 108a -108n, 112; phones 114-124, etc.) corresponding to the collected telephone numbers using the signaling protocols and/or components implemented by voice network 104, such as SCPs, SSPs, SCPs, ISCPs, SS7 protocol infrastructures, etc.

[097] Conference bridge 324 may also extract, from the conference bridge message, the information reflective of whether different conference users have authorization to participate in a collaboration between conference users. In one embodiment, conference bridge 324 may include an appropriate indicator of whether a specific conference user is authorized for collaboration as part of call data associated with the call from conference bridge 324 to the specific conference user.

[098] In addition, application server 516 may initiate a collaboration from the perspective of the party initiating the computer-enhanced conference call (step 612). For example, application server 516 may launch collaboration software (e.g., WebEx, NetMeeting, etc.) from the viewpoint of the initiating user. More particularly, application server 516 may open collaboration software that is stored, for example, local to application server 516 or on a user-terminal 112 designated for use by the initiating user. Thereafter, features associated with the collaboration software that cause data to be shared may be activated. The initiating user may also select data to be shared in a collaborative session and otherwise configure the collaboration software in preparation for a collaborative session between the initiating user and the other conference users.

[099] Once communication is attempted to be established with a conference user, methods and systems consistent with certain aspects related to the present invention may perform a computer-enhanced conference call process. Fig. 7 is a diagram of an exemplary flowchart of a method for conducting a computer-enhanced conference call consistent with the principles of the present invention. Although the steps of the flowchart are described in a particular order, one skilled in the art will appreciate that these steps may be performed in a modified or different order. Further, one or more of the steps in Fig. 7 may be performed concurrently or in parallel.

[0100] As shown, the computer-enhanced conference call process may begin when a conference bridge, such as conference bridge 324, attempts to establish communication contact with a conference user by calling a device associated with the conference user (e.g., user terminal 108a, phone 120, etc.) (step 702). SSP 308 or 310 may intercept the call from conference bridge 324 (step 704). SSP 308 or 310 may intercept the call because it encountered a trigger, such as a terminating attempt trigger or a specific digit string trigger, associated with the call. For example, a trigger may be set at SSP 308 or 310 on each of the lines corresponding to a digital companion customer, that is, a user that subscribes to various services of service center 106. In this manner, a trigger is set to detect calls received at the SSP that are directed to telephone numbers of digital companion customers. In one embodiment, a conference user must be a digital companion customer in order to participate in a computer-enhanced conference call. For the purposes of this description, assume that conference users are digital companion customers.

[0101] After intercepting the call, SSP 308 or 310 sends a query to ISCP 302 requesting further instructions. In response, ISCP 302 sends call information to a network access server 410 (step 706). In one embodiment, the call information may be sent to network access server 410 via a Generic Data Interface (GDI), using a message structure associated with GDI (e.g., GetData, SendData, or InvokeApp). The call information sent to network access server 410 may also be sent in an encrypted form.

[0102] The call information may include, for example, call state data, a call intercept parameter, a voice mail parameter, time zone data, user ID, called number data, calling name data, calling number data, and calling party number (CPN) presentation information. The call information may also include an indicator that the call is part of a computer-enhanced conference call and data reflective of whether the called conference user is authorized to participate in a collaboration with other conference users. One of ordinary skill in the art will appreciate that additional information may be included with the call information, or that some of the previously noted information may be omitted from the call information.

[0103] Call state data may provide the current call state based on processing (e.g., AIN processing) that has already occurred for the call. For example, some possible values for call state data may be indicative of a call being authorized for termination, a call being to a call intercept (CI) service node or IP, a call being from a CI service node or IP, a call being a priority call from the CI service node or IP, a call having a CI error encountered on a call to a CI service node or IP, or a call being on the first leg of a click-to-dial call.

[0104] The call intercept parameter identifies when a customer (e.g., conference user) subscribes to a call intercept feature. In one embodiment, a call intercept feature allows a customer to stop invalid numbers that typically appear as “unavailable,” “private,” “anonymous,” or “out of area” on a caller ID display. The feature may tell callers that unidentified calls are not accepted and ask them to record a name. If an unidentified caller does not record a name or enter an override code, the called party's phone will not ring, thus eliminating interruptions from unidentified callers.

[0105] The voice mail parameter identifies when a customer has voice mail capability. Time zone data refers to the customer's time zone. Called number data refers to the number of a called device associated with the customer. User ID refers to a parameter that may have one of two values. If a distinctive ring feature is present, then user ID is set to a primary number value. If no such feature is present, then user ID is set to the same value as the called number. Distinctive ring, for example, may provide a customer with additional telephone numbers on a single line, with their own unique ringing pattern. A customer's primary number is the main number associated with the line.

[0106] Calling number data refers to the number of the caller. This parameter may contain such a number when it is available. In addition, the parameter may contain a calling party address when the information is made available by a previously executed AIN service. Otherwise, the calling number parameter may include some arbitrary string of digits or characters (e.g., ten zeros) when the caller ID information does or does not match a particular format.

[0107] Calling name data refers to the name of the calling party. This parameter may be retrieved when available, for example, by ISCP 302 from a database such as LIDB 312. It may be typically possible to retrieve the calling name when the database was populated with this data by a previously executed AIN service. If the calling name is not successfully retrieved, then the calling name parameter may include, for example, an arbitrary string of digits or characters (e.g., zeros) indicative of situations where there was no response from LIDB 312, there was an erroneous response from LIDB 312, there was no name returned from LIDB 312, the format of the caller ID is not in conformance, or the caller ID presentation is restricted.

[0108] Upon receiving the call information from ISCP 302, network access server 410 may decrypt the information, if necessary, and forward the received information to application server 516 (step 708). Application server 516 may then determine whether the conference user associated with the triggered phone number (e.g., destination/dialed phone number) is logged into the digital companion system. Application server 516 makes this determination, for example, by performing a lookup in a database, such as database 522, using the called number as an index. Based on the called number, application server 516 can determine a digital companion customer ID. This digital companion customer ID may have a number of access points (e.g., user terminals 108, 112) associated with it. Application server 516 may lookup entries in database 522 that correspond to the digital companion customer ID to determine whether the conference user is currently logged onto the system using any access points. For example, whenever a conference user is logged onto the system using an

access point, an indication of such is stored in database 522. If application server 516 finds such an indication in database 522, then it knows that the conference user is logged on, and it knows which access point the conference user is using.

[0109] If the conference user is not logged on anywhere, then there is no way for service center 106 to communicate with the conference user using digital companion operations. Instead, service center 106 logs the call. When the conference user logs in at a later time, the conference user is provided with an indication that the conference user was called. Calls may be logged, for example, in database 522 or in other storage on digital companion server 406 or communication portal server 408. The call may be subsequently routed without digital companion processing. In this manner, a conference user that is not logged into the digital companion system may be able to answer a phone call from conference bridge 324 and participate in a conference call, but may not be able to participate in any collaboration between conference users. The conference user may also not be able to receive notifications consistent with the present invention.

[0110] If the conference user is logged on, then application server 516 retrieves call preference information from a database (step 710). In one embodiment, the database storing this call preference information may be database 522, customer profile database 532, or another database used to store customer-related data. The call preference information may include, for example, call block lists, lists of forwarding devices or telephone numbers, voice mail preferences, lists of recordings that the conference user can set as pre-recorded messages, etc.

[0111] Once the various call preferences have been retrieved, application server 516 may determine one or more preferred devices for the conference user. A preferred device may be, for example, a device that the conference user previously designated for use in computer-enhanced conference calls. The preferred device may be ultimately determined by a number of factors. For example, application server 516 may be set to recognize a device indicated in the retrieved call preferences as the preferred device. The device indicated in the call preferences may be different depending on the disposition of the call. For example, a conference user may select different devices for answering calls, voice mail, screening calls, participating in computer-enhanced conference calls, etc.

[0112] In one embodiment, application server 516 may instead recognize a predetermined default device as a preferred device. A default device may be selected, for example, when a conference user neglects to explicitly specify a device as the preferred device.

[0113] In another embodiment, application server 516 may instead recognize the last device used by a conference user as the preferred device. The last device used may also be selected, for example, when a conference user neglects to explicitly specify a device as the preferred device. The conference user also may explicitly select an option that specifies the last device used as the preferred device.

[0114] Application server 516 may also receive information from calendar server 518 concerning preferred devices. For example, calendar server 518 may maintain information that indicates which device is specified as a preferred device for a

conference user in a particular time period (e.g., specific times, days, months, etc.). As such, a conference user may, in advance, specify time periods during which different devices are designated as preferred devices. Whenever there is a time period in which the conference user scheduled a specific preferred device, calendar server 518 notifies application server 516 of the preferred device to be set for the conference user.

[0115] Application server 516 may also provide the collected information (e.g., call information, call preference information, and access point information) to notification server 520 and instruct notification server 520 to send a computer-enhanced conference call notification to the conference user associated with the called number (e.g., by providing an indication of the access point that the conference user is using to the notification server 520). Notification server 520 has open connections to all devices (e.g., user terminals 112) that are logged on. When notification server 520 receives information from application server 516, it uses the information to route a computer-enhanced conference call notification to the conference user at the appropriate access point (step 712). The device receiving the notification may or may not be a device designated by the conference user as the preferred device. In one embodiment, the notification may be sent using a protocol such as HTTP (Hypertext Transfer Protocol), Java, or a similar protocol.

[0116] The computer-enhanced conference call notification may present a conference user with the option of agreeing to participate in a conference call. For example, the notification may include for display a user-selectable option for accepting or declining the computer-enhanced conference call request. The notification may also

identify other conference users, as well as identify which conference user initiated the computer-enhanced conference call (e.g., the initiating user). Other types of notifications may include additional information associated with the conference call, such as subject of the call, a proposed agenda, etc. Also, in the case that the conference user receiving the notification is the initiating user, the notification may provide an indication that a computer-enhanced conference call has been configured in accordance with a request by the initiating user.

[0117] If the conference user does not accept the computer-enhanced conference call request (step 714 - No), then an appropriate notification may be sent to the initiating user (step 716). For example, network access server 410 may receive response information from the device of the conference user that received the computer-enhanced conference call notification. The response information may include information indicative of the conference call request denial. In response, network access server 410 may request application server 516 to instruct notification server 520 to provide the initiating user with a notification that indicates that the conference user declined the request. Options other than declining the conference call request outright (e.g., do not accept the call and hang up) may also be provided to the conference user. For example, other options may include leaving a message for the initiating user, setting an alternate telephone number to contact the conference user, and instructing conference bridge 324 to dial back in a user-specified amount of time. Further information on options for declining a conference call request may be found in U.S.

Patent Application No. _____ (Attorney Docket No. 03-1012), which is herein incorporated by reference.

[0118] If the conference user accepts the computer-enhanced conference call request (step 714 - Yes), then a determination is made as to whether the conference user is authorized to participate in a collaboration with other conference users (step 718). For example, network access server 410 may receive response information from the device of the conference user that received the computer-enhanced conference call notification. The response information may include information indicative of the conference call request acceptance. In response, network access server 410 may instruct application server 516 to examine the call information previously received in step 708, in order to determine whether the conference user has collaboration authorization.

[0119] If application server 516 determines that the conference user does not have collaboration authorization (step 718-No), then the computer-enhanced conference call may proceed without collaboration for the conference user (step 720). In this manner, the conference user may communicate with other conference users as though involved in a conference telephone call, but the conference user may not share data with other conference users (e.g., participate in a collaboration). For example, upon determining that the conference user does not have collaboration authorization, application server 516 may instruct network access server 410 to request that ISCP 302 complete the call to the conference user from conference bridge 324. More particularly, network access server 410 may request that ISCP 302 forward the call to a preferred

device of the conference user on which the conference user wishes to receive conference calls specifically or phones calls generally. Alternatively, network access server 410 may request that ISCP 302 complete the call "as dialed" to a device that corresponds to the phone number provided by the initiating user.

[0120] If application server 516 determines that the conference user has collaboration authorization (step 718-Yes), the computer-enhanced conference call may proceed with collaboration for the conference user (step 722). For example, the application server 516 may initiate the collaboration from the conference user's perspective using the aforementioned collaboration software. More particularly, application server 516 may open collaboration software that is stored, for example, on the device to be used by the conference user in the collaboration, and cause the collaboration software to automatically include the conference user in the collaboration that has already been initiated from the perspective of the initiating user. In one embodiment, the device to be used by the conference user in the collaboration may have already been determined as part of the process to determine a preferred device for the conference user. Alternatively, once application server 516 has opened the collaboration software, the conference user may be prompted to provide additional input to complete the collaboration connection. This additional input may be, for example, an indication of a device to use in the collaboration, confirmation that the collaboration should proceed, or other information that may be useful in configuring the collaboration software.

[0121] In addition to the collaboration being initiated from the conference user's perspective, network access server 410 may also proceed to instruct ISCP 302 to notify conference bridge 324 to connect the conference user to the conference call in a manner consistent with the conference call connection described above in conjunction with step 720. In this manner, the conference user may communicate with other conference users using a conference telephone call and/or a collaboration.

[0122] While the present invention has been described in connection with various embodiments, many modifications will be readily apparent to those skilled in the art. One skilled in the art will also appreciate that all or part of the systems and methods consistent with the present invention may be stored on or read from computer-readable media, such as secondary storage devices, like hard disks, floppy disks, and CD-ROM; a carrier wave received from a network such as the Internet; or other forms of ROM or RAM. Accordingly, embodiments of the invention are not limited to the above described embodiments and examples, but instead is defined by the appended claims in light of their full scope of equivalents.